Using Spotlight's Query API's

Session 104

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Application Technologies

Using Spotlight's Query API's

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http://developer.apple.com/wwdc2005/

Agenda

- Understanding the technology
- Getting metadata out of a file
- Performing queries

Understanding the Technology

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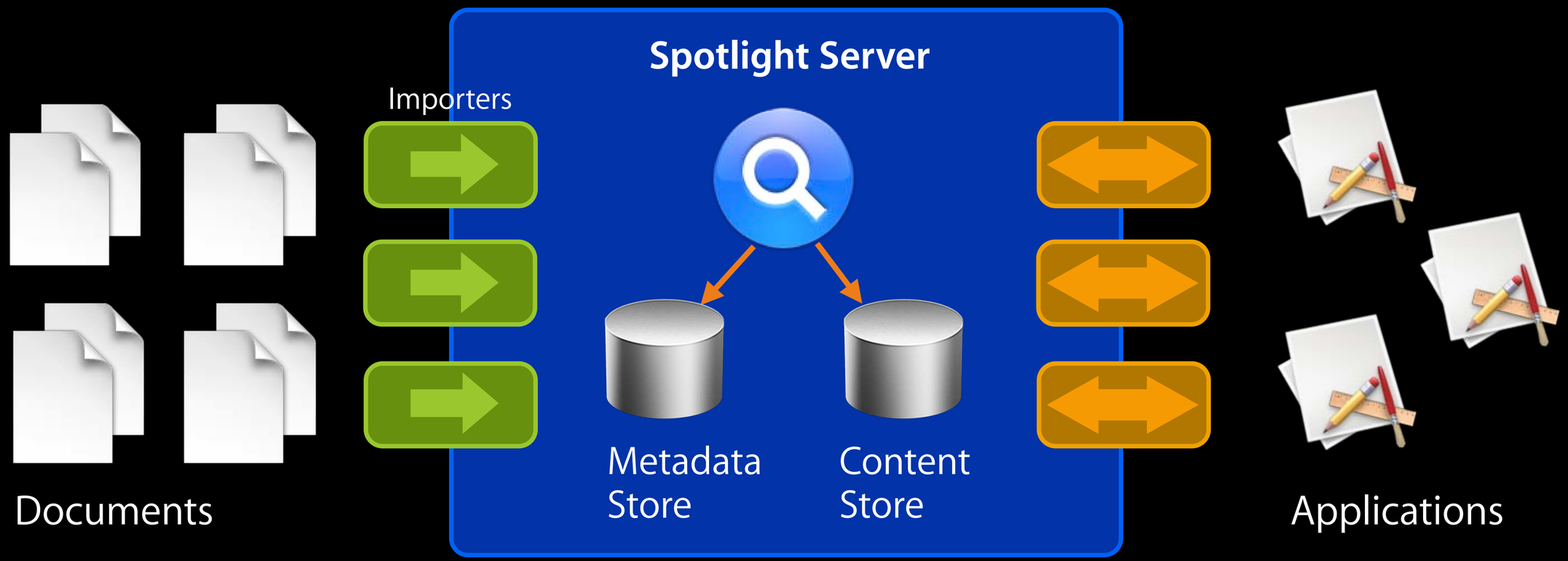
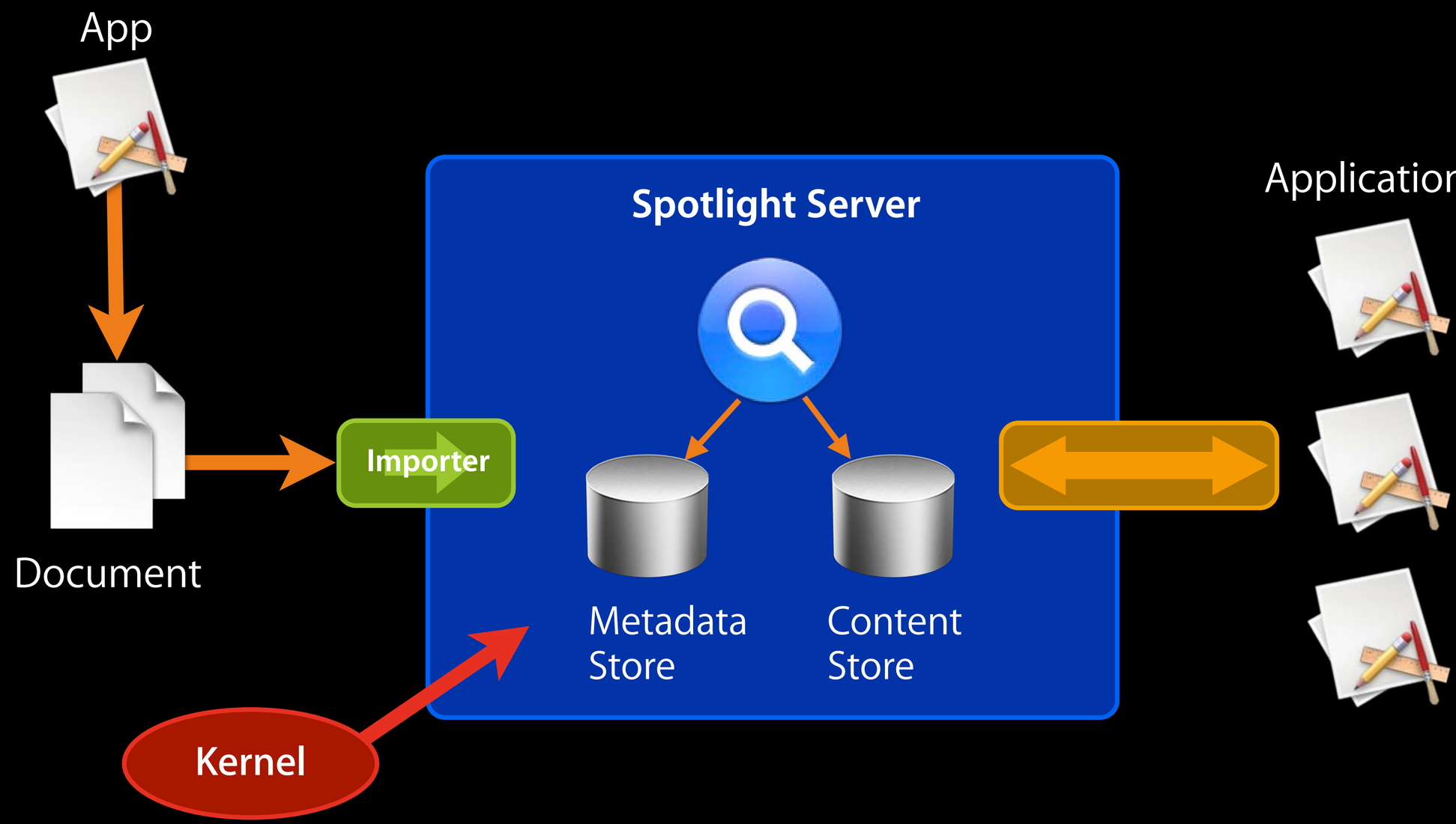
Spotlight Architecture



Spotlight Architecture



Three API Sets for Three Different Needs

- Plugin APIs
  - Importing metadata from a file
  - See Lab 1003: Writing a Spotlight importer
- Get Metadata APIs
  - Accessing Metadata from a file
- Query APIs
  - Query the DB, searching for items

All available in CoreServices Framework

Accessing Metadata From a File

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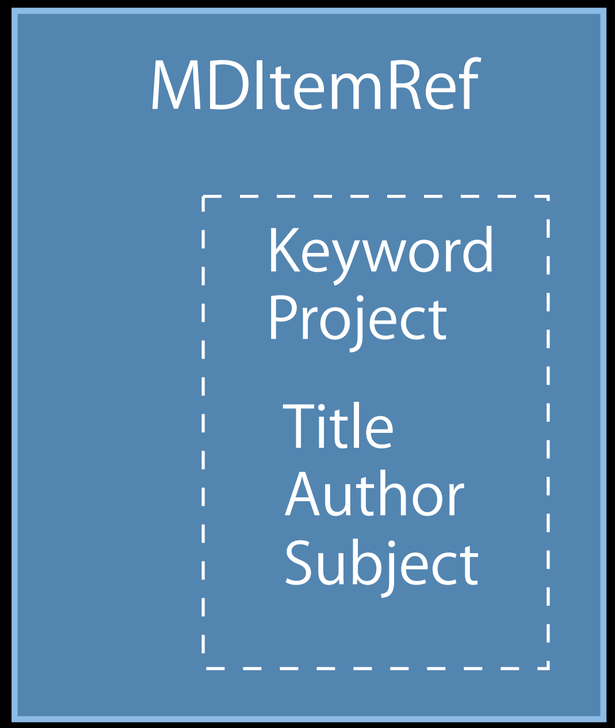
Accessing Metadata From a File: Why?

- Need to get information from a file
  - Properties (Author, number of pages etc.)
  - File System information (creation date, size etc.)
- Example:
  - GetInfo Panel
  - Document Properties window

MDItemRef: Key Object to Use Spotlight

Represents a file in the Metadata database



Retrieving Metadata from a File: How?

Three simple steps

1. Create MDItemRef for the File
2. Obtain list of available attributes
3. Retrieve Metadata

Retrieving Metadata from a File

1. Create MDItemRef for a particular file

```
MDItemRef itemRef;

path = CFSTR(“/Applications/Address Book.app”);
itemRef = MDItemCreate(kCFAllocatorDefault,path);
```

Retrieving Metadata from a File

2. Get a list of all the attributes

```
CFArrayRef      names;
CFDictionaryRef values;

names = MDItemCopyAttributeNames(itemRef);
      // returns all the attribute names
```

Retrieving Metadata from a File

3. Get all of the attributes

```
CFArrayRef      names;
CFDictionaryRef values;

names = MDItemCopyAttributeNames(itemRef);
      // returns all the attribute names

values = MDItemCopyAttributes(itemRef,names);
      // Returns a Dictionary containing names and
      // values
```

Results

```
com_MarketAnalyst_accountbalance = "$10,005,559,452"
com_MarketAnalyst_accountname    = "TDWaterhouse"
com_MarketAnalyst_AccountType    = "Individual Account"
com_MarketAnalyst_closedtrades   = (
    "Long Position on TXN - # Shares: 100,000)
com_MarketAnalyst_openedtrades   = (
    "Long Position on AAPL - # Shares: 10,000 - Sell Price: $140.00")
kMDItemAttributeChangeDate       = 2005-05-05 11:08:14 -0700
kMDItemComment                   = "Tiger!!!!!!"
kMDItemContentCreationDate       = 2005-01-19 14:43:04 -080
```

Results

```
com_MarketAnalyst_accountbalance = "$10,005,559,452"
com_MarketAnalyst_accountname    = "TDWaterhouse"
```

Got Text?

Getting Descriptive Attributes

How to obtain localized names for attributes

- Localized name of attributes
  - “Authors” instead of kMDItemAuthors
- Localized descriptions

Getting Descriptive Attributes

How to obtain localized names for attributes

```
CFStringRef fullName;

fullName = MDSchemaCopyDisplayNameForAttribute(kMDItemVideoBitRate);
```

CopyDisplayNameForAttribute will localize the value

`kMDItemVideoBitRate`

- “Débit vidéo” in French
- “Video bit rate” in English

Getting the Attribute's Description

How to obtain localized description for attributes

```
CFStringRef desc;

desc = MDSchemaCopyDisplayDescriptionForAttribute(kMDItemDisplayName);
```

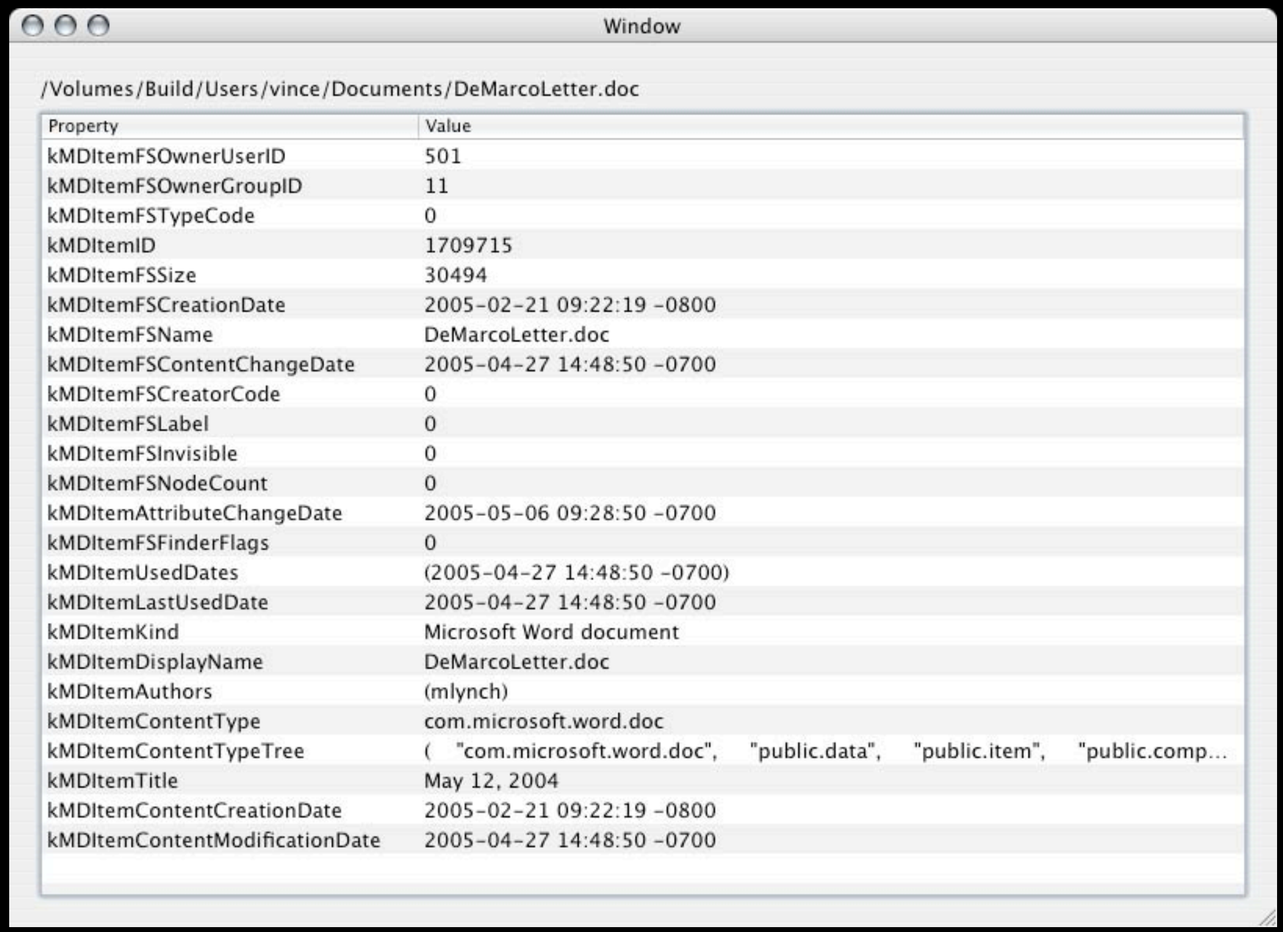
desc = "Name of the media file"

Metadata Demo

Vince DeMarco
Spotlight Engineering Team

http://developer.apple.com/wwdc2005/

Metadata Demo



Performing Queries

http://developer.apple.com/wwdc2005/

Searching for Files With Spotlight: Why?

Because it could be a very cool feature in your app

- Enable search in your application allows:
  - Offer user a new way to search on your Application Data files:
    - Example: Searching though 100 of texture files
  - Offer user to search on related files to current document

Searching With Spotlight: How?

- Key Objects
- Understanding the query language
- Understanding the modes of queries
- Implementing an example

Searching With Spotlight: Key Objects

- MDItemRef
  - Represents a result or file on disk
- MDQueryRef encapsulates
  - A query string
  - Results

Searching With Spotlight: Query Language

- A query is a simple "C" like expression on attributes and values

```
kMDItemContentType == "public.rtf"
```

- Types: strings, numbers, dates
- Operators:
  - Strings: == !=
  - Numbers: == != < <= > >= range
  - Dates: == != < <= > >=
- Groupings: && || ( )
- Logical: !

Example of Simple Queries

- Searching by type

```
kMDItemContentType == “public.plain-text”
```

- Searching by text

```
kMDItemTextContent ==“WWDC”
```

- Searching in an Array

```
kMDItemKeywords == “Important”
```

- Wildcard searching

```
kMDItemDisplayName == “A*”
```

String Match Modifiers

- There are three supported modifiers
  - c : The comparison is case insensitive
    - “spotlight” == “SPOTLIGHT”
  - d : The comparison is diacritical insensitive
    - “elegant” == “élégant”
  - w : The comparison is word based, and also detects transitions in case
    - Light == “SpotLight”
    - “Paris” != “comparison”

```
kMDItemTitle ==“ light*”wdc
```

Building More Complex Queries

- Using the UTI hierarchy
  - Finding all audio content
  - Finding all images

```
kMDItemContentTypeTree = “public.image” ==“WWDC”
```

- Using more complex expressions
  - Find all images that have an alpha channel and a certain resolution

```
kMDItemContentTypeTree = “public.image” &&
kMDItemResolutionHeightDPI >= 300 &&
kMDItemHasAlphaChannel == 1
```

Demo

Query Using mdfind

http://developer.apple.com/wwdc2005/

Implementing Search in Your Application

http://developer.apple.com/wwdc2005/

Ways to Implement Search

- You can implement the search opening the Spotlight Window
- Performing a query within your application

Opening the Spotlight Window

- Provides a quick and easy way to integrate Spotlight into your application

```
HISearchWindowShow(stringToSearch,0);
```

- Example of integration
  - Address Book
  - Text Edit
- Good to present related items to the user
  - App doesn’t get back the results

Performing a Query Within Your Application

Three simple steps

- Create an MDQueryRef
- Register Callback for Updates
- Execute the query

1. Create a MDQueryRef

```
CFStringRef queryStr;

queryStr = CFSTR(“kMDItemContentType ==
‘public.plain-text’”);
query = MDQueryCreate
(kCFDefaultAllocator,queryStr,NULL,NULL);
```

2. Register Callback for Live Updates

```
CFNotificationCenterRef localCenter;
localCenter = CFNotificationCenterGetLocalCenter();

CFNotificationCenterAddObserver(localCenter,NULL,
MyUpdateFunction,
kMDQueryDidFinishNotification,
query,CFNotificationSuspensionBehaviorCoalesce);
```

- **Typically you would register for all of the notifications**
  - kMDQueryDidFinishNotification
  - kMDQueryProgressNotification
  - kMDQueryDidUpdateNotification

MDQuery Callbacks

kMDQueryProgressNotification

- Is sent while results are being gathered by the server

kMDQueryDidFinishNotification

- Is sent when the query has completed

kMDQueryDidUpdateNotification

- Lets you know that some aspect of the query has
- Only sent when the query is live

2.5. Implementing Notification Callback

```
MyUpdate(CFNotificationCenterRef center,
    void *observer,
    CFStringRef name,
    const void *object,
    CFDictionaryRef userInfo)
{
 MDQueryRef   query;

 query = (MDQueryRef)object;
 // update your UI etc.
}
```

3. Executing the Query

```
MDQueryExecute(query,kMDQueryWantsUpdates);
```

- Second parameter flags can be
  - kMDQuerySynchronous
  - kMDQueryWantsUpdates

Retrieving Results

Retrieving Results

- Two calls
  - MDQueryGetResultCount()
  - MDQueryGetResultAtIndex()

MDQueryGetResultCount()

- Returns the number of MDItemRefs that the query matched

```
MDQueryRef query;
CFIndex    count;

count = MDQueryGetResultsCount(query);
// returns the number of items in the query
```

MDQueryGetResultAtIndex()

- Returns the MDItemRef at a particular index

```
MDQueryRef query;
CFIndex    index;
MDItemRef  item;

item = MDQueryGetResultsAtIndex(query,index)
```

Retrieving Results: Some Advice

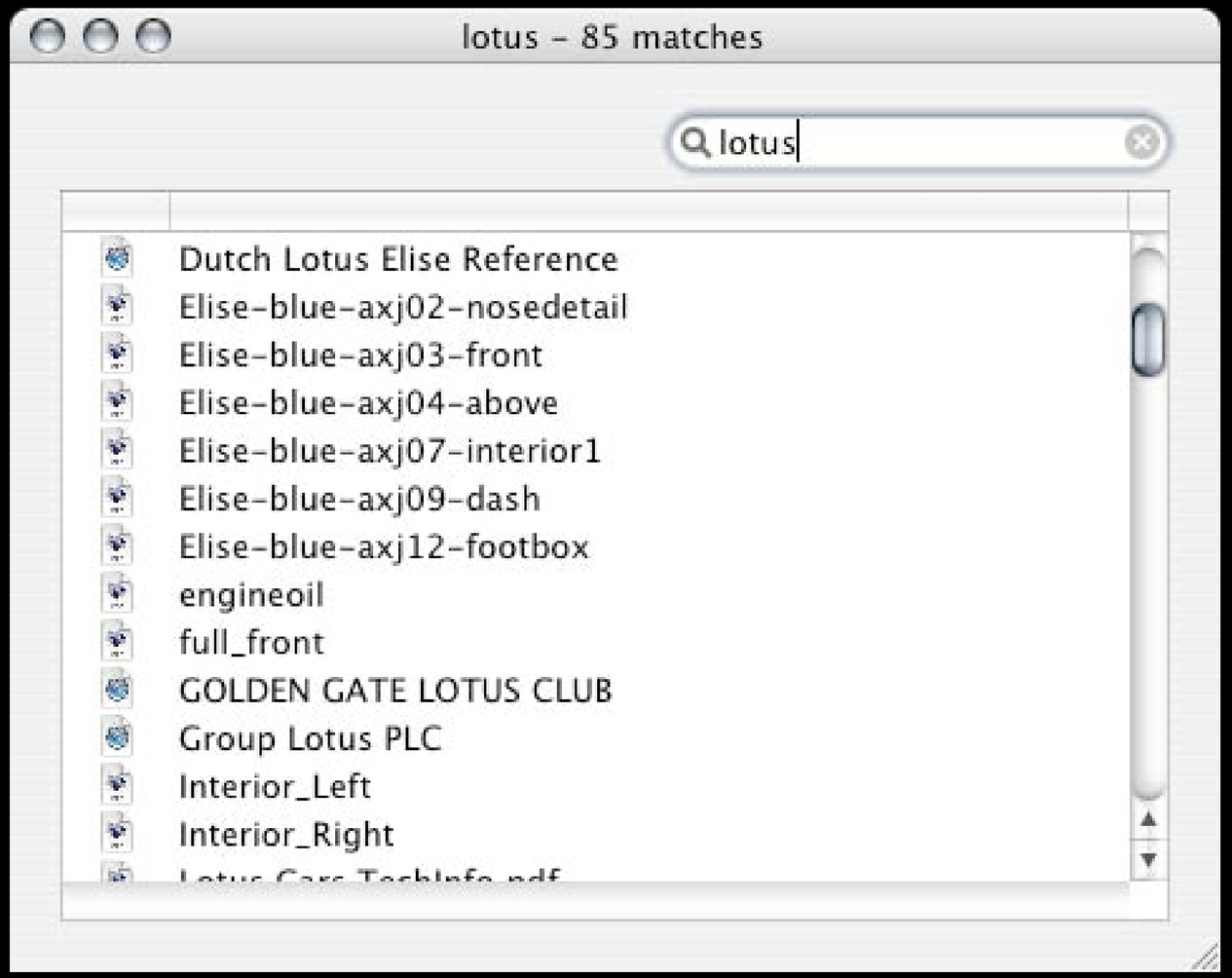
- Result set can change while iterating
  - MDQueryEnableUpdates/MDQueryDisableUpdates guards against this
- Results are live
  - Items can come and go: be aware

Demo

Query

http://developer.apple.com/wwdc2005/

Query Demo


lotus – 85 matches
lotus
Dutch Lotus Elise Reference
Elise-blue-axj02-nosedetail
Elise-blue-axj03-front
Elise-blue-axj04-above
Elise-blue-axj07-interior1
Elise-blue-axj09-dash
Elise-blue-axj12-footbox
engineoil
full_front
GOLDEN GATE LOTUS CLUB
Group Lotus PLC
Interior_Left
Interior_Right

Advanced

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Sorting

- The Metadata library sorts attributes in ascending order

```
CFStringRef queryStr;
CFArrayRef  sortAttr;

/* SortAttr CFArrayRef containing
  kMDItemDisplayName,kMDItemAuthor
*/
queryStr = CFSTR(“kMDItemTitle == ‘Important’wdc);
query = MDQueryCreate(NULL,queryStr,NULL,sortAttr);
```

Scoping the Query

- Restricting a query to a directory

```
CFArrayRef scopeDirectories;

/*
  scope contains path to directories to search
*/
MDQuerySetSearchScope(query,scopeDirectories, 0);
```

Sorting/Scoping Demo

http://developer.apple.com/wwdc2005/

Fetching Query Attributes

- Each call to MDItemCopyAttributeNames() involves a message to the server
  - Instead set the sorting attributes on the query to the attributes that you will need to display etc.

```
CFStringRef queryStr;
CFArrayRef  sortAttr;

/* SortAttr CFArrayRef containing
 kMDItemContentType
*/
queryStr = CFSTR(“*=’vince’wdc”);
query = MDQueryCreate(NULL,queryStr,NULL,sortAttr);
```

Fetching Query Values

- Then use MDQueryGetIndexOfResult() and MDQueryGetAttributeValueOfResultAtIndex() to get the values of the attributes

```
MDItemRef   ref;
CFIndex     index;
CFStringRef value;

/* ref is a MDItemRef from the query */
index = MDQueryGetIndexOfResult(query,ref);
value = MDQueryGetAttributeValueOfResultAtIndex(query,
      kMDItemContentType,index);
```

Summary

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http://developer.apple.com/wwdc2005/

Summary: Search Made Easy

- Make Search easy in your application:
  - Free Search in NAV and Save panels
  - Add new features with MDItemCreate
- From your application help your users:
  - Find their documents
  - Track documents from within your app
  - Offer new ways to search for *your* content

For More Information

http://developer.apple.com/wwdc2005/

Related Sessions

What's New With File System	Session 506 Tuesday 5:00PM
Uniform Type Identifiers and Launch Services	Session 107 Tuesday 5:00PM
Lab 1003: Writing a Spotlight importer	Application Technologies Lab Wednesday 12:00PM

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Q&A

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